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THE COKE-CHEMICAL INDUSTRY IN THE USSR

10 September 1951

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THE COKE-CHEMICAL INDUSTRY IN THE USSR

SUMMARY

The restoration of the coke-chemical industry in the USSR has progressed rapidly, and the output in 1950 closely approached that of 1940, when the industry achieved its maximum production. The Soviet coke-chemical industry in 1950 produced approximately one-third of that in the United States. The plants in the Donbas region will probably be restored to their prewar capacity by the end of 1952, and those in the Dnieper region by the end of 1954.

From 1950 through 1953 the output of coke-chemicals in the USSR probably will increase by about 48 percent. This increase will be due to restoration of the plants in the South, to expansion of existing plants in the Urals and East Siberia, and to the installation of new facilities in conjunction with steel mills now under construction.

1. Introduction.

Coke-chemicals are the by-products derived in the production of coke. A study of the individual plants producing coke-chemicals in the USSR reveals that before 1927 the only domestic production of coke-chemicals was a small trickle from the prerevolutionary installation at Kemerovo, consisting of three batteries of French Koppers ovens with by-products plants. ^{1/} The remainder of the coke, required for pig iron production, was produced by nine installations in the Donbas region, none of which recovered by-products. (For the production of individual coke-chemical plants in the USSR, see Appendix.)

2. First Five Year Plan (1928-32).

One of the first steps taken by the Soviets in embarking during the middle 1920's on the industrial rehabilitation and development of the USSR was the utilization of the vast coal resources in the creation of a large coke-chemical and steel industry. Considerable foreign equipment and engineering skill were enlisted, and in 1928 three coke-chemical plants were put into operation, two in the Donbas (Voroshilovsk and Kadievka) and one in the Crimea (Kerch). During the period of the First Five Year Plan (1928-32) intensive efforts were directed toward expansion of the newly created industry, and by 1932 nine additional plants had been put into operation. Five of these plants were located in the Donbas (Gorlovka, Mekeevka, Stalino, Ruchenkovo, and Kramatorsk), three were located in the Dnieper region (Dnepropetrovsk, Zaporozhye, Dneprodzerzhinsk), and one was located in the Urals (Magnitogorsk). During this period the Soviets

1. A battery is a number of individual coke ovens connected in one integrated system. In the coke ovens, coal is destructively distilled to produce coke and the gases, oils, and tars from which coke-chemical by-products are derived.

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developed a by-product battery of their own, called the Soviet Koppers, and began to manufacture parts for this battery and its chemical plants. All of the plants put into operation during this period were built with Soviet Koppers batteries, with the exception of Gorlovka (German Koppers), Magnitogorsk (US Koppers), and possibly Dnepropetrovsk (type unknown). At this time, however, not all of the parts for the Soviet Koppers battery were Soviet-manufactured. Thus, at the end of 1932, a total of 13 coke-chemical plants were in operation. The production of coke-chemicals in 1932 is rather difficult to assess because of the rapidly expanding status of the industry at that time. The 1932 production estimate (see Table 2) represents the maximum output attainable. Actual production was undoubtedly much lower because of normal operating difficulties that would have been encountered in starting up the chemical plants.

3. Second Five Year Plan (1933-37).

During the period of the Second Five Year Plan (1933-37), seven more coke-chemical plants were installed: two in the Donbas (Mariupol, Konstantinovka), one in the Dnieper region (Krivoi Rog), one in the Urals (Gubakha), and one in West Siberia (Stalinsk). In addition, the city gas plants of Moscow and Leningrad with their coke-chemical plants probably were installed during this period. Including the two city gas plants, a total of 20 coke-chemical plants were in operation by 1937, and production of coke-chemicals had increased by an estimated 300 percent during the 5-year period. (For an estimate of the production of coke-chemicals in 1937, see Table 2.)

4. Third Five Year Plan (1938-42).

During the period of the Third Five Year Plan (1938-42), one new plant at Tagil in the Urals was put into operation. The peak Soviet production of coke-chemicals was attained in 1940, and output during that year registered an increase of at least 21 percent over 1937. Undoubtedly production would have continued to increase and probably more new plants would have been installed, but World War II intervened, halting progress in the industry. Prior to the German invasion, 21 coke-chemical plants were operating in the USSR. The German advance in 1940-41 caused the immediate or eventual destruction of the Moscow and Leningrad gas plants and the 14 plants in the South, resulting in a loss of about 71 percent of the total production of coke-chemicals and leaving only 5 plants in operation. Wartime shortages of coke-chemicals were alleviated by large Lend-Lease shipments of toluol (113,884 short tons), phenol (38,594 tons), TNT (139,186 tons), picric acid (1,411 tons), and smaller quantities of cresols, anthracene, various intermediates, and finished products, including large quantities of ammunition. (For the estimated production of coke-chemicals in 1940 and 1943, see Table 2.)

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5. Fourth Five Year Plan (1946-50).

Following the expulsion of the German Army from Soviet territory, reconstruction of the coke-chemical plants in the Donbas was begun immediately. 1/ Reconstruction of the plants in the Dnieper region was delayed because of the necessity of first reconstructing the Dnieper Power Plant.

In calculating the production of coke-chemicals of the individual plants and the total Soviet output (see Table 2), it was assumed that the plants in the Donbas did not produce in 1947. It is true that, according to a reliable source (see footnote), there probably was a small output of ammonium sulphate, naphthalene, anthracene, and pitch in the Donbas in that year. However, the amount of these coke-chemicals compared to the total Soviet output was probably almost negligible. It is certain that the plants in the Dnieper region did not contribute to 1947 production.

1. The procedure followed in the restoration of the coke-chemical plants in the Donbas is revealed by the following reliable report:

"The first object of reconstruction was the coal washing plant and the coke oven. The second object, the most necessary one, was the condensation department or gas blowing department which draws the by-products and gases from the coke ovens and returns the more or less clean gases for heating the coke ovens. These were necessary in order to get the plant into operation at all. Plants other than the one I am thinking of were put into operation in the same sequence. The next department which was put into operation at the plant was the coal tar distillation department. During the condensation process, the coal tar was condensed out. This coal tar was then distilled. The very first department put into operation after the coke ovens had been put into operation was the coal tar distillation department, and this was not put into full operation; that is, the products were more or less not finished products. The coal tar was distilled into a pitch; the raw naphthalene, the raw anthracene, the carbolic oil, and then impregnating oil were run off. These were about the only products which could be received by direct distillation without the restoration of the rest of the coal tar distillation plant, such as the carbolic acid plant which absorbs the carbolic acid from the carbolic oils, the pure naphthalene plants, the more or less pure anthracene plants, and the other oil distillation plants. In 1947, that was the condition of the plant. The next department that was supposed to be put into operation was the sulphate department. The reconstruction of this had only just begun in 1947. Therefore, I would say that the extent of restoration of the chemical departments would be somewhere around 10 to 25 percent, at the most, in 1947."

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In calculating the total 1949 Soviet output, it was assumed that by then the Donbas plants had been sufficiently restored to allow the recovery of coke-chemicals equivalent to approximately 50 percent of the maximum practical yield from the coal processed. It was also assumed that the plants in the Dnieper region did not produce any coke-chemicals in 1949. In calculating the total 1950 Soviet output, it was assumed that the Donbas plants and the Dnieper region plants would recover a quantity of coke-chemicals equivalent to approximately 75 percent and 25 percent, respectively, of the maximum practical yields from the coal consumed in the coking process.

6. Production.

The production of coke-chemicals for the years 1951, 1952, and 1953 (see Table 3) has been forecast on the basis of the estimate of the output of coke for those years as modified by the following assumptions:

- a. That, in 1951, the plants of the Donbas and of the Dnieper region will recover coke-chemicals equivalent to 90 percent and to approximately 50 percent, respectively, of the maximum practical yields from the coal processed.
- b. That, in 1952, the Donbas plants and the Dnieper plants will recover coke-chemicals equivalent in quantity to 100 percent and to approximately 70 percent, respectively, of the maximum yields normally possible.
- c. That, in 1953, the Dnieper plants will recover coke-chemicals equivalent in quantity to 90 percent of the maximum yields normally possible.

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The following tables (1-7) give production estimates and certain requirements for the Soviet coke-chemical industry.

Table 1

Approximate Average Yields of the Principal Coke-Chemicals
in the USSR^{a/}

Product	Yield per Metric ton of Coke (lbs.)	Yield per 1,000 Metric Tons of Coke (Metric Tons)
Benzol, Refined	17.9 (2.44 gals.)	8.15
Toluol	4.37 (0.61 gals.)	1.98
Xylene	1.57	0.71
Ammonium Sulfate	29.0	13.15
Ammonia Gas	7.5	3.4
Coal Tar	95.0 (9.5 gals.)	43.0
Naphthalene	4.0	1.8
Phenol	0.84	0.38 (840 lbs.)
Cresols	1.32	0.6 (1,320 lbs.)
Xylenols	0.24	0.11 (240 lbs.)
Anthracene	6.3	2.85
Creosote Oil	25.2	11.4
Pitch	41.0	18.6
Solvent Naphtha	1.79	0.815

^{a/} These figures were arrived at by a consideration of US coking practice as modified by information concerning coking practice in the USSR.

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Table 2

Estimated Production of Coke-Chemicals in the USSR
1928, 1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons							
	1928	1932	1937	1940	1943	1947 ^{a/}	1949	1950
Benzol, Crude	20.85	73.4	196.0	238.0	104.0	124.5	176.0	230.0
Benzol, Refined	15.49	54.45	145.67	176.74	77.37	92.43	130.69	171.23
Toluol	3.758	13.22	35.362	42.975	18.81	22.446	31.726	41.61
Xylene	1.348	4.735	12.68	15.38	6.74	8.03	11.43	14.92
Ammonium Sulfate	22.5	79.0	212.0	257.0	112.0	134.0	190.0	249.0
Ammonia Liquor, (NH ₃ Content) ^{b/}	0.644	2.26	6.06	7.35	3.21	3.84	5.43	7.12
Coal Tar	81.7	287.0	767.0	935.0	409.0	488.0	690.0	907.0
Naphthalene	3.42	12.0	32.2	39.1	17.1	20.4	28.7	37.9
Phenol	0.722	2.538	6.788	8.246	3.612	4.305	6.043	7.97
Cresols	1.14	4.008	10.73	13.03	5.7	6.824	9.544	12.63
Xylenols	0.209	0.735	1.965	2.386	1.045	1.247	1.554	2.318
Anthracene	5.42	19.0	51.0	61.8	27.1	32.4	45.4	60.0
Creosote Oil	21.65	76.2	203.9	247.5	108.2	129.0	181.5	240.0
Pitch	35.3	124.0	332.0	404.0	177.0	211.0	296.0	392.0
Solvent Naphtha	1.55	5.45	14.57	17.67	7.74	9.24	13.07	17.15
Pyridine	0.645	2.27	6.06	7.35	3.22	3.84	5.4	7.1

^{a/}One source estimates that the 1947 production of refined benzol in the USSR amounted to 115,000 metric tons and that the output of toluol in this same year was 28,000 metric tons. It is believed that these figures are slightly high, because this source slightly overestimates the total USSR coke production for that year. The estimate by this same source of ammonium sulfate production for 1947 is slightly lower than that shown above, because a slightly smaller yield factor is used by the source.

^{b/}A reliable source estimates that about 90 percent of the ammonia produced in the coking process was recovered as sulfate and that 10 percent was recovered as ammonia liquor. In the individual plant studies all the ammonia is listed as sulfate, since it is not known which plants produce the liquor. Under the total USSR production, however, 90 percent of the ammonia is shown as sulfate, and 10 percent is shown as liquor.

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Table 3

Estimated Production of Coke-Chemicals in the USSR
1951-53

Product	Thousand Metric Tons		
	1951	1952	1953
Benzol, Crude	270.0	310.0	340.0
Benzol, Refined	200.0	230.0	252.0
Toluol	48.7	56.0	61.3
Xylene	17.45	20.0	21.9
Ammonium Sulfate	292.0	336.0	368.0
Ammonia Liquor (NH ₃ Content) a/	8.33	9.6	10.5
Coal Tar	1,060.0	1,220.0	1,335.0
Naphthalene	44.3	51.0	55.8
Phenol	9.32	10.7	11.7
Cresols	14.8	17.0	18.6
Xylanols	2.715	3.12	3.42
Anthracene	70.2	80.8	88.5
Creosote Oil	281.0	324.0	355.0
Pitch	458.0	527.0	577.0
Solvent Naphtha	20.1	23.1	25.3
Pyridine	8.32	9.57	10.5

a/ A reliable source estimates that about 90 percent of the ammonia produced in the coking process is recovered as sulfate and that 10 percent is recovered as ammonia liquor. In the individual plant studies all the ammonia is listed as sulfate, since it is not known which plants produce the liquor. Under the total USSR production, however, 90 percent of the ammonia is shown as sulfate, and 10 percent is shown as liquor.

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Table 4

Estimated Raw Material Requirements for the Production of
Soviet Coke-Chemicals in 1950 a/

	<u>Kilowatt- hours</u>	<u>Metric Tons</u>
Coal (As Mined)	-	44,000,000
Coal (As Charged to Coke Ovens <u>b/</u>)	-	33,000,000
Sulfuric Acid (60°Be)	-	249,000
Lime	-	20,000
Steam	-	8,250,000
Electric Power	297,000,000	-

a/ For the coke-chemicals output available from these raw material inputs in 1950, see Table 2.

b/ The high ratio of charged coal to the output of coke-chemicals is explained by the partial restoration of the plants in the Donbas and Dnieper regions.

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Table 5

Comparison of Estimated Soviet Production of Coke-Chemicals
in 1950 with US Production in 1949

Product	US Production	Soviet Production	Soviet Production as % of US Production
	1949	1951 (Estimated)	
	Metric Tons		
Benzol, Refined a/	470,000	171,230	36.4
Toluol b/	226,000	53,610	23.7
Xylene c/	172,000	14,920	8.7
Naphthalene	135,000	37,900	28.1
Phenol d/	101,000	35,470	35.1
Cresols	5,570	12,630	226.0

a/ The US figures includes motor benzol.

b/ The figures include toluol produced from petroleum which, in the case of the USSR, is tentatively estimated at 12,000 metric tons per year.

c/ The US figure includes xylene from petroleum; the Soviet figure does not.

d/ The figures include synthetic phenol which, in the case of the USSR, is tentatively estimated at 27,500 metric tons per year.

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Table 6

Pattern for Estimated Soviet Benzol Requirements a/
1950-1953

Use	% of Total	1950	1951	1952	1953
		Metric Tons			
Petroleum Industry (for Manufacture of Ethyl Benzene and Cumene for Aviation Gasoline)	30.0	51,370	60,000	69,000	75,500
Phenol	16.0	27,500	32,150	35,800	39,200
Aniline	6.0	10,000	11,700	13,450	14,730
Explosives (Picric Acid, Ammonium Picrate, Tetryl, Dinitro- benzene, Diphenylamine, Centralite I) b/	6.0	10,000	11,700	13,450	14,730
Styrene	3.0	5,000	5,850	6,725	7,360
Dichlorobenzene	2.0	3,500	4,090	4,700	5,150
Monochlorobenzene (Exclusive of DDT, Phenol, and Aniline)	2.0	3,500	4,090	4,700	5,150
Nitrobenzene (Exclusive of Aniline)	1.0	2,500	2,920	3,360	3,680
DDT	0.7	1,200	1,400	1,610	1,760
Diphenyls	0.7	1,200	1,400	1,610	1,760
Synthetic Detergents	0.6	1,000	1,170	1,345	1,470
Miscellaneous (Exports, Motor Fuel, Nylon, Denaturant, Maleic Anhy- dride, Insecticides, etc.)	32.0	54,460	63,530	74,250	81,510
Total	100.0	171,230	200,000	230,000	252,000

a/ This consumption pattern for 1950-1953 represents the estimated quantities of benzol that will be consumed by the USSR during those years for the uses specified. The assumption has been made that the current "cold war" conditions will continue to exist. Should the USSR become involved in a major war, the pattern outlined above would be considerably altered. The quantities of benzol now allocated for the manufacture of aviation gasoline, explosive, and other essential military products would be greatly increased at the expense of that benzol now allocated for less essential uses.

b/ This is a random estimate, no data having been received from the military regarding requirements for explosives.

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Table 7

Pattern for Estimated Soviet Toluol Requirements a/
1950-53

Use	% of Total	1950	1951	1952	1953
Metric Tons					
Explosives (TNT) <u>b/</u>	13.7	10,000	11,500	13,000	14,200
Chemicals (Benzoic Acid, Lacquers, Dyes, Perfumes, Toluidines, Tolidines, Saccharin, etc.)	56.0	30,000	34,500	39,200	42,700
Solvent (for Gums, Resins, Oils, etc.)	25.3	13,610	15,700	17,800	19,400
Total <u>c/</u>	<u>100.0</u>	<u>53,610</u>	<u>61,700</u>	<u>70,000</u>	<u>76,300</u>

a/ This consumption pattern for 1950-1953 represents the estimated quantities of toluol that will be consumed by the USSR during those years for the uses specified. The assumption has been made that the current "cold war" conditions will continue to exist. Should the USSR become involved in a major war, practically all the toluene produced would be allocated for the manufacture of TNT.

b/ This is a random estimate, no data having been received from the military regarding requirements for explosives.

c/ The figures include the following produced from petroleum: 12,000 metric tons in 1950, 13,000 in 1951, 14,000 in 1952, and 15,000 in 1953.

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APPENDIX

COKE-CHEMICAL PLANTS IN THE USSR
AND THEIR PRODUCTION

(Estimated as of 1 January 1951)

1. Chelyabinsk
Chelyabinsk Oblast
Urals

Number of Batteries: Probably 4
Type of Batteries: Soviet Koppers
By-products Plants: Complete

Estimated Production
1947, 1949-50

Product	Thousand Metric Tons		
	1947	1949	1950
Coke	840.0	1,260.0	1,400.0
Benzol, Refined	6.84	10.27	11.4
Toluol	1.66	2.5	2.77
Xylene	0.596	0.895	0.994
Ammonium Sulfate	11.05	16.59	18.4
Coal Tar	36.1	54.2	60.2
Naphthalene	1.51	2.27	2.52
Phenol	0.319	0.479	0.532
Cresols	0.504	0.755	0.84
Xylenols	0.092	0.139	0.154
Anthracene	2.4	3.6	4.0
Cresote Oil	9.6	14.3	16.0
Pitch	15.6	23.4	26.0
Solvent Naphtha	0.684	1.02	1.14

General Information.

One source states that two batteries of Soviet Koppers coke ovens were installed here in the late 1930's with complete by-products plants and that two more batteries were added during the war. Another source states that the first battery with a capacity of 420,000 tons went into operation in May 1944 and that the second battery with the same capacity went into operation in July 1944. The third battery was reported to have been put into operation in July 1948, and it was stated that this battery was to increase production 1.5 times. It is believed that a fourth battery has been put into operation since 1948.

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2. Dnepropetrovsk
Dnepropetrovsk Oblast
South Region

Number of Batteries: 4
Type of Batteries: Unknown
By-products Plants: Complete

Estimated Production
1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons						
	1932	1937	1940	1943	1947	1949	1950
Coke	900	1,200	1,500	0	0	500	700
Benzol, Refined	7.33	9.78	12.2	0	0	0	1.43
Toluol	1.78	2.38	2.97	0	0	0	0.35
Xylene	0.64	0.85	1.06	0	0	0	0.124
Ammonium Sulfate	11.84	15.78	19.7	0	0	0	2.3
Coal Tar	38.7	51.5	64.5	0	0	0	7.51
Naphthalene	1.62	2.15	2.71	0	0	0	0.31
Phenol	0.342	0.456	0.57	0	0	0	0.067
Cresols	0.54	0.72	0.9	0	0	0	0.105
Xylenols	0.099	0.132	0.165	0	0	0	0.019
Anthracene	2.57	3.45	4.28	0	0	0	0.5
Creosote Oil	10.2	13.2	17.1	0	0	0	2.0
Pitch	16.7	22.3	28.0	0	0	0	3.25
Solvent Naphtha	0.73	0.98	1.2	0	0	0	0.14

General Information.

Four batteries of coke ovens with complete by-products plants were installed here in 1929. All plants were demolished in 1941 and were still inoperative in 1947. Aerial photographs of May 1944 show the works to be extensively damaged, with some of the major installations destroyed. Reconstruction of the by-products plants in the Dnieper region lagged behind reconstruction of the Donbas plants, principally because of the necessity of first reconstructing the "Dnieprstroil" Power Plant. Reconstruction of two coke batteries was reported as completed in April 1948. It is assumed that the plants were not in operation in 1949, but it is believed that in 1950 they were sufficiently restored to recover by-products equivalent in quantity to 25 percent of the maximum yield from the coal processed. Reconstruction of the plants in this region probably will not be completed until about 1953-54.

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3. Dneprodzerzhinsk (Kamenskoe)
Dnepropetrovsk Oblast
South Region

Number of Batteries: 4
Type of Batteries: Soviet Koppers
By-products Plants: Complete

Estimated Production
1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons						
	1932	1937	1940	1943	1947	1949	1950
Coke	100	1,000	1,200	0	0	260	500
Benzol, Refined	0.815	8.15	9.78	0	0	0	1.02
Toluol	0.198	1.98	2.38	0	0	0	0.25
Xylene	0.071	0.71	0.85	0	0	0	0.09
Ammonium Sulfate	1.315	13.15	15.78	0	0	0	1.64
Coal Tar	4.3	43.0	51.5	0	0	0	5.38
Naphthalene	0.18	1.8	2.15	0	0	0	0.22
Phenol	0.038	0.38	0.456	0	0	0	0.047
Cresols	0.06	0.6	0.72	0	0	0	0.075
Xylenols	0.011	0.11	0.132	0	0	0	0.014
Anthracene	0.285	2.85	3.42	0	0	0	0.36
Cresote Oil	1.14	11.4	13.7	0	0	0	1.43
Pitch	1.86	18.6	22.3	0	0	0	2.32
Solvent Naphtha	0.082	0.82	0.98	0	0	0	0.1

General Information.

Four batteries of Soviet Koppers coke ovens with complete by-products plants were built here in 1932. A nitrogen fixation plant was installed in 1935. All plants were destroyed in 1941 and were still inoperative in 1947. Two batteries were reported as restored in June 1949. Reconstruction of this plant, along with the other plants in the Dnioper region, lagged, and probably no coke-chemicals were produced in 1949. In 1950, it is assumed that the by-products plants were sufficiently restored to recover some by-products equivalent in quantity to 25 percent of the maximum practical yield from the coal processed.

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4. Gorlovka
Stalino Oblast
South Region

Number of Batteries: 4
Type of Batteries: 2 German Koppers, 2 Soviet Koppers
By-products Plants: Benzol, Sulfate, and Tar Plants

Estimated Production
1928, 1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons							
	1928	1932	1937	1940	1943	1947	1949	1950
Coke	600	900	1,480	1,500	0	650	780	1,050
Benzol, Refined	0	7.33	12.1	12.2	0	0	3.18	6.42
Toluol	0	1.78	2.93	2.97	0	0	0.77	1.56
Xylene	0	0.64	1.05	1.06	0	0	0.275	0.56
Ammonium Sulfate	0	11.84	19.45	19.7	0	0	5.12	10.37
Coal Tar	0	38.7	63.7	64.5	0	0	16.775	33.9
Naphthalene	0	1.62	2.67	2.71	0	0	0.47	1.42
Phenol	0	0.342	0.562	0.57	0	0	0.099	0.296
Cresols	0	0.54	0.888	0.9	0	0	0.156	0.472
Xylenols	0	0.099	0.163	0.165	0	0	0.029	0.086
Anthracene	0	2.57	4.22	4.28	0	0	0.745	2.25
Creosote Oil	0	10.2	16.9	17.1	0	0	3.0	8.92
Pitch	0	16.7	27.5	28.0	0	0	4.83	14.6
Solvent Naphtha	0	0.73	1.2	1.2	0	0	0.32	0.645

General Information.

This plant began operations in 1928 after the construction of two batteries by German Koppers. In 1932, two additional Soviet Koppers batteries were installed with benzol, sulfate, and tar plants utilizing all gas. The Soviet Koppers batteries were batteries of Soviet design based on Koppers original designs and were built under Soviet supervision with equipment partly imported and partly manufactured by Soviet factories. A complete nitrogen fixation plant was put into operation about 1935.

Because of the German invasion, this plant was completely demolished in 1941 and remained inoperative until 1946, when two batteries were restored. As of 1947, all chemical plants were still inoperative. Three coke batteries were reported as operating in October 1949, and the chemical plants were reported to be producing benzol, tar, and unknown gases. The benzol rectification plant was probably also operating in October 1949, since the plant was reported to be producing saccharin at that time. The coal tar distillation plant was reported to have been put into operation in August 1949. The yield of coal tar products for 1949, therefore, has been calculated on a basis of a 4-month operation. The yield of other products for 1949 has arbitrarily been calculated on the basis of a 6-month operation. It is believed that in 1950 the by-products plants were

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sufficiently restored to produce a quantity of chemicals equivalent to 75 percent of the maximum practical yield from the coal processed.

The figures given above for the production of chemical by-products are believed to be reasonably accurate for every year except possibly 1932, when production was undoubtedly lower because of the starting up of the chemical plants. The maximum production of this plant was achieved in 1940 and probably will not be reached again until about 1952 or 1953.

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5. Gubakha
Molotov Oblast
Urals

Number of Batteries: Probably 4
Type of Batteries: Soviet Koppers
By-products Plants: Probably Complete

Estimated Production
1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons					
	1937	1940	1943	1947	1949	1950
Coke	280	350	500	700	750	750
Benzol, Refined	2.28	2.85	4.08	5.71	6.11	6.11
Toluol	0.554	0.693	0.99	1.39	1.49	1.49
Xylene	0.2	0.25	0.355	0.5	0.533	0.533
Ammonium Sulfate	3.68	4.6	6.58	9.21	9.87	9.87
Coal Tar	12.0	15.0	21.5	30.0	32.3	32.3
Naphthalene	0.504	0.63	0.9	1.26	1.39	1.39
Phenol	0.106	0.133	0.19	0.266	0.285	0.285
Cresols	0.168	0.21	0.3	0.42	0.45	0.45
Xylenols	0.031	0.039	0.055	0.077	0.083	0.083
Anthracene	0.8	1.0	1.42	2.0	2.15	2.15
Creosote Oil	3.19	4.0	5.7	7.97	8.54	8.54
Pitch	5.2	6.5	9.3	13.0	13.9	13.9
Solvent Naphtha	0.23	0.28	0.41	0.57	0.61	0.61

General Information.

Two batteries of Soviet Koppers coke ovens with by-products plants were installed here in 1933. One more battery was added during the war. As of 1941, three batteries were reported as operating with a production of 400,000 tons of coke per year, and a fourth battery was stated to be under construction.

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6. Kemerovo
Kemerovo Oblast
West Siberia

Number of Batteries: 7
Type of Batteries: 2 French Koppers, 5 Soviet Koppers
By-products Plants: Complete

Estimated Production
1928, 1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons							
	1928	1932	1937	1940	1943	1947	1949	1950
Coke	800	800	855	1,100	1,600	1,700	1,800	1,800
Benzol, Refined	6.52	6.52	6.97	8.95	13.04	13.85	14.65	14.65
Toluol	1.58	1.58	1.68	2.18	3.17	3.37	3.56	3.56
Xylene	0.567	0.567	0.607	0.78	1.13	1.21	1.28	1.28
Ammonium Sulfate	10.52	10.52	11.23	14.48	21.05	22.35	23.7	23.7
Coal Tar	34.4	34.4	36.8	47.25	66.8	73.0	77.5	77.5
Naphthalene	1.44	1.44	1.54	1.98	2.88	3.05	3.24	3.24
Phenol	0.304	0.304	0.325	0.418	0.608	0.646	0.684	0.68
Cresols	0.48	0.48	0.513	0.66	0.96	1.04	1.08	1.03
Xylenols	0.088	0.088	0.094	0.121	0.176	0.187	0.198	0.19
Anthracene	2.3	2.3	2.46	3.13	4.6	4.85	5.15	5.15
Creosote Oil	9.1	9.1	10.1	12.5	18.2	19.4	20.6	20.6
Pitch	14.9	14.9	15.9	20.5	29.8	31.6	33.5	33.5
Solvent Naptha	0.65	0.65	0.7	0.89	1.3	1.38	1.46	1.46

General Information.

One source states that two French Koppers and two Soviet Koppers batteries of coke ovens with by-products plants were installed here before the Revolution; that four Soviet Koppers batteries were built in the early 1930's and that two more batteries were added during World War II; that complete by-products plants had been built along with the ovens; that a nitrogen fixation plant was put into operation in 1936; and that several fine organics plants had been installed in the late 1930's and early 1940's. Another source reports that before 1927 three batteries of ovens with a total capacity of 285,000 metric tons of coke were installed here. This same source reports that the fourth and fifth batteries, each of 55 ovens and each with a capacity of 285,000 metric tons, were completed during the First Five Year Plan (1928-32) and that the sixth and seventh batteries, which were exact duplicates of the fourth and fifth batteries, were completed in 1938 and 1942, respectively. The capacity for production of coke at this plant was reported as 855,000 metric tons in 1937, 1,140,000 tons in 1940, 1,200,000 tons in 1942, 1,500,000 tons in 1943, and 1,755,000 tons in 1944.

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7. Korch
Crimea Oblast
South Region

Number of Batteries: 2 (until 1942)
Type of Batteries: French Koppers
By-products Plants: Complete

Estimated Production
1928, 1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons							
	1928	1932	1937	1940	1943	1947	1949	1950
Coke	200	500	700	700	0	0	0	0
Benzol, Refined	1.63	4.08	5.71	5.71	0	0	0	0
Toluol	0.396	0.99	1.39	1.39	0	0	0	0
Xylene	0.142	0.355	0.497	0.497	0	0	0	0
Ammonium Sulfate	2.63	6.58	9.21	9.21	0	0	0	0
Coal Tar	8.6	21.5	30.0	30.0	0	0	0	0
Naphthalene	0.36	0.9	1.25	1.25	0	0	0	0
Phenol	0.076	0.19	0.266	0.266	0	0	0	0
Cresols	0.12	0.3	0.42	0.42	0	0	0	0
Xylenols	0.022	0.055	0.077	0.077	0	0	0	0
Anthracene	0.575	1.43	2.00	2.0	0	0	0	0
Creosote Oil	2.28	5.7	7.98	7.98	0	0	0	0
Pitch	3.72	9.3	13.0	13.0	0	0	0	0
Solvent Naphtha	0.16	0.41	0.57	0.57	0	0	0	0

General Information.

Two batteries of French Koppers coke ovens with complete by-products plants were built here by the French in 1928. All plants were demolished in 1942. One source states that the plants were partly restored in 1946. Other sources indicate that the old plant was discontinued, that a new steel plant was being built, and that coke would be supplied by the Kirov plant.

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8. Kirov (Old Makeevka)
Stalino Oblast
South Region

Number of Batteries: 4
Type of Batteries: Unknown
By-products Plants: Probably Complete

Estimated Production
1949-50

<u>Product</u>	<u>Thousand Metric Tons</u>	
	<u>1949</u>	<u>1950</u>
Coke	675.0	780.0
Benzol, Refined	2.75	4.77
Toluol	0.67	1.15
Xylene	0.24	0.414
Ammonium Sulfate	4.44	7.69
Coal Tar	14.5	25.1
Naphthalene	0.61	1.05
Phenol	0.128	0.222
Cresols	0.203	0.351
Xylenols	0.037	0.645
Anthracene	0.97	1.68
Creosote Oil	3.85	6.67
Pitch	6.28	10.87
Solvent Naphtha	0.28	0.48

General Information.

Prior to World War II (1940), four batteries of 326 coke ovens without by-products recovery were installed here. The plant was demolished during the war and remained inactive until 1949, when three batteries were restored with by-products recovery.

Lacking further information concerning this plant, it is assumed that complete by-products recovery plants are installed and that in 1949 the production of coke-chemicals amounted to 50 percent of the maximum yield from the coal processed. It is assumed that in 1950 the output of coke-chemicals was equivalent to approximately 75 percent of the maximum practical yield from the coal processed.

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9. Konstantinovka
Stalino Oblast
South Region

Number of Batteries: 1 (40 Ovens)
Type of Batteries: Unknown
By-products Plants: Extent of by-products recovery unknown,
assumed to be complete.

Estimated Production
1937, 1940, 1943, 1947, 1949-50

<u>Product</u>	<u>Thousand Metric Tons</u>					
	<u>1937</u>	<u>1940</u>	<u>1943</u>	<u>1947</u>	<u>1949</u>	<u>1950</u>
Coke	200	200	0	200	250	300
Benzol, Refined	1.63	1.63	0	0	1.02	1.84
Toluol	0.396	0.396	0	0	0.247	0.447
Xylene	0.142	0.142	0	0	0.089	0.16
Ammonium Sulfate	2.63	2.63	0	0	1.644	2.96
Coal Tar	8.6	8.6	0	0	5.375	9.67
Naphthalene	0.36	0.36	0	0	0.225	0.405
Phenol	0.076	0.076	0	0	0.048	0.086
Cresols	0.12	0.12	0	0	0.075	0.135
Xylenols	0.022	0.022	0	0	0.014	0.025
Anthracene	0.575	0.575	0	0	0.36	0.637
Creosote Oil	2.28	2.28	0	0	1.42	2.57
Pitch	3.72	3.72	0	0	2.32	4.19
Solvent Naphtha	0.16	0.16	0	0	0.1	0.188

General Information.

As of 1940, 40 by-products ovens were installed here. This plant was destroyed during the war and probably remained inactive until about 1947. The planned production for 1950 was reported to be 1,000 metric tons of coke a day.

It is probable that no coke-chemicals were recovered in 1947, but it is assumed that by 1949 by-products recovery amounted to 50 percent of the maximum yield from the coke produced. It is probable that in 1950 the production of coke-chemicals was equivalent to approximately 75 percent of the maximum practical yield from the coal processed.

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10. Kramatorsk
Stalino Oblast
South Region

Number of Batteries: 1 (50 Ovens)
Type of Batteries: Collins 8 $\frac{1}{2}$ -ton Ovens
By-products Plants: Extent of by-product recovery unknown,
assumed to be complete.

Estimated Production
1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons						
	1932	1937	1940	1943	1947	1949	1950
Coke	100	200	200	0	100	200	250
Benzol, Refined	0.815	1.63	1.63	0	0	1.63	2.04
Toluol	0.198	0.396	0.396	0	0	0.396	0.49
Xylene	0.071	0.142	0.142	0	0	0.142	0.17
Ammonium Sulfate	1.315	2.63	2.63	0	0	2.63	3.28
Coal Tar	4.3	8.6	8.6	0	0	8.6	10.75
Naphthalene	0.10	0.36	0.36	0	0	0.36	0.45
Phenol	0.033	0.076	0.076	0	0	0.076	0.09
Cresols	0.06	0.12	0.12	0	0	0.12	0.15
Xylenols	0.011	0.022	0.022	0	0	0.022	0.02
Anthracene	0.288	0.575	0.575	0	0	0.575	0.72
Creosote Oil	1.14	2.28	2.28	0	0	2.28	2.85
Pitch	1.86	3.72	3.72	0	0	3.72	4.65
Solvent Naphtha	0.03	0.16	0.16	0	0	0.16	0.2

General Information.

As of 1940, 50 Collins 8 $\frac{1}{2}$ -ton ovens were installed here with by-products recovery. The extent of the by-products recovery is unknown, but until further information is received, it is assumed to be complete. This plant was demolished during the war and remained inactive until 1947, when the production was reported as 50 percent of prewar, and reconstruction to prewar capacity was planned to be completed in two years. It is probable that no coke-chemicals were produced in 1947, but it is assumed that by 1949 the by-products plants had been sufficiently restored to recover coke-chemicals approximately proportional to the quantity of coke produced.

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11. Krivoi Rog
Dnepropetrovsk Oblast
South Region

Number of Batteries: 2
Type of Batteries: Soviet Koppers
By-product Plants: Complete

Estimated Production
1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons					
	1937	1940	1943	1947	1949	1950
Coke	700	800	0	0	260	500
Benzol, Refined	5.71	6.52	0	0	0	1.02
Toluol	1.39	1.58	0	0	0	0.25
Xylene	0.497	0.567	0	0	0	0.09
Ammonium Sulfate	9.21	10.52	0	0	0	1.64
Coal Tar	30.0	34.4	0	0	0	5.38
Naphthalene	1.25	1.44	0	0	0	0.23
Phenol	0.266	0.304	0	0	0	0.047
Cresols	0.42	0.48	0	0	0	0.075
Xylanols	0.077	0.088	0	0	0	0.014
Anthracene	2.0	2.28	0	0	0	0.36
Creosote Oil	7.98	9.12	0	0	0	1.42
Pitch	13.0	14.9	0	0	0	2.32
Solvent Naphtha	0.57	0.65	0	0	0	0.1

General Information.

Two batteries of Soviet Koppers coke ovens were built here in 1933 with complete by-products plants. All plants were demolished in 1941 and were still inoperative in 1947. As is the case with the other Dnieper region plants, reconstruction of this plant lagged, and it is probable that there was no coke-chemical production in 1949. Lacking definite information, it is assumed that by 1950 the by-products plants were sufficiently restored to recover coke-chemical equivalent to 25 percent of the maximum yield from the coke produced.

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12. Magnitogorsk
Chelyabinsk Oblast
Urals

Number of Batteries: 10
 Type of Batteries: 4 US Koppers, 6 Soviet Koppers
 By-products Plants: Complete

Estimated Production
1932, 1937, 1940, 1943, 1947, 1949-50

<u>Product</u>	<u>Thousand Metric Tons</u>						
	<u>1932</u>	<u>1937</u>	<u>1940</u>	<u>1943</u>	<u>1947</u>	<u>1949</u>	<u>1950</u>
Coke	330	1,900	2,500	3,100	3,300	3,500	3,775
Benzol, Refined	2.69	15.49	20.4	25.2	26.9	28.5	30.8
Toluol	0.653	3.76	4.95	6.13	6.53	6.92	7.48
Xylene	0.234	1.35	1.78	2.2	2.34	2.48	2.68
Ammonium Sulfate	4.34	25.0	32.9	40.8	43.4	46.0	49.7
Coal Tar	14.2	61.7	107.5	133.0	142.0	150.0	162.0
Naphthalene	0.594	3.42	4.5	5.58	5.94	6.3	6.8
Phenol	0.125	0.722	0.95	1.18	1.25	1.33	1.43
Cresols	0.198	1.14	1.5	1.86	1.98	2.1	2.27
Xylenols	0.036	0.209	0.274	0.341	0.363	0.385	0.415
Anthracene	0.95	5.45	7.2	8.9	9.5	10.0	10.75
Creosote Oil	3.75	21.7	28.5	35.4	37.6	39.8	43.0
Pitch	6.13	35.3	46.5	57.7	61.3	65.0	70.4
Solvent Naphtha	0.27	1.55	2.04	2.52	2.69	2.85	3.08

General Information.

Two batteries of US Koppers coke ovens were installed here in 1931, and two more were added in 1933. The fifth, sixth, and seventh batteries (all Soviet Koppers) were completed on 3 July 1942, 9 November 1943, and 24 July 1944, respectively. The eighth battery went into operation in July 1945. Two additional batteries were planned for the Fourth Five Year Plan (1946-50). Complete by-products plants were put into operation along with the ovens.

The yields of coke-chemicals listed above for 1932 probably are high, since the plant was just beginning operations, but it is believed that the yields listed for the other years are approximately correct.

13. Makoevka
Stalino Oblast
South Region

Number of Batteries: 4
 Type of Batteries: Soviet Koppers
 By-product Plants: Complete

Estimated Production
 1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons					
	1932	1937	1940	1943	1947	1949 1950
Coke	600	1,200	1,500	0	600	1,050 1,200
Benzol	4.89	9.78	12.2	0	0	4.28 7.33
Toluol	1.19	2.38	2.97	0	0	1.04 1.79
Xylene	0.426	0.852	1.06	0	0	0.37 0.639
Ammonium Sulfate	7.89	15.78	19.7	0	0	6.91 11.83
Coal Tar	25.8	51.5	64.5	0	0	22.6 38.6
Naphthalene	1.08	2.16	2.7	0	0	0.95 1.62
Phenol	0.228	0.456	0.57	0	0	0.198 0.342
Cresols	0.36	0.72	0.9	0	0	0.315 0.54
Xylenols	0.066	0.132	0.165	0	0	0.057 0.099
Anthracene	1.71	3.45	4.28	0	0	1.5 2.59
Cresote Oil	6.85	13.7	17.1	0	0	6.0 10.3
Pitch	11.15	22.3	27.9	0	0	9.75 16.7
Solvent Naphtha	0.49	0.98	1.22	0	0	0.43 0.735

General Information.

This plant began operations in 1932 after the installation of four batteries of Soviet Koppers 16-ton ovens. Complete by-products plants were installed but no nitrogen fixation was included. The entire installation was demolished in 1941 and remained inactive until 1946, when the reconstruction of two batteries was completed without by-products recovery. Lacking definite information, it is assumed that by 1949 all of the by-products plants were sufficiently restored to allow by-products recovery equivalent to 50 percent of the maximum yield from the coal processed. In 1950 by-products recovery probably was equivalent to 75 percent of the maximum practical yield from the coal processed.

Reconstruction of the fourth battery was reported to be completed as of December 1948. The maximum production of this plant was evidently reached in 1940 and probably will be reached again by about 1952.

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14.

a. Moscow
Moscow Oblast
Central Industrial

b. Leningrad
Leningrad Oblast
Northwest Region

Number of Batteries: 2 at Each Plant
Type of Batteries: Unknown
By-products Plants: Complete

Combined Estimated Production
1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons					
	1937	1940	1943	1947	1949	1950
Coke	200	0	0	200	250	250
Benzol, Refined	1.63	0	0	1.63	2.04	2.04
Toluol	0.396	0	0	0.396	0.495	0.495
Xylene	0.142	0	0	0.142	0.177	0.177
Ammonium Sulfate	2.63	0	0	2.63	3.288	3.288
Coal Tar	8.6	0	0	8.6	10.75	10.75
Naphthalene	0.36	0	0	0.36	0.45	0.45
Phenol	0.076	0	0	0.076	0.095	0.095
Cresols	0.12	0	0	0.12	0.15	0.15
Xylenols	0.022	0	0	0.022	0.028	0.028
Anthracene	0.575	0	0	0.575	0.72	0.72
Creosote Oil	2.28	0	0	2.28	2.85	2.85
Pitch	3.72	0	0	3.72	4.65	4.65
Solvent Naphtha	0.16	0	0	0.16	0.2	0.2

General Information.

The Moscow and Leningrad city gas plants have two batteries each of coke ovens and by-products plants. The combined production of both plants is listed above. The planned future combined production of these two plants is 350,000 metric tons of coke per year.

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15. ~~Orsk~~
Chkalov Oblast
Urals

Number of Batteries: 2
Type of Batteries: Soviet Koppers
By-products Plants: Probably Complete

Estimated Production
1950

<u>Product</u>	<u>Thousand Metric Tons</u>
	<u>1950</u>
Coke	475
Benzol, Refined	3.87
Toluol	0.94
Xylene	0.337
Ammonium Sulphate	6.24
Coal Tar	20.4
Naphthalene	0.85
Phenol	0.181
Cresols	0.285
Xylenols	0.052
Anthracene	1.365
Cresote Oil	5.41
Pitch	8.82
Solvent Naphtha	0.39

General Information.

It was reported that four batteries of Soviet Koppers coke ovens with by-products plants were built here in 1939. This same source stated that this plant was built by the NKVD and that almost nothing about it was ever published. Other sources, however, indicated that as of 1946 the plant was still under construction and that only two batteries were planned for the Fourth Five Year Plan (1946-50).

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16. Petrovsk-Zabaikal
Chita Oblast
Eastern Siberia

Number of Batteries: 2
Type of Batteries: Unknown
By-products Plants: Probably Complete

Estimated Production
1949-50

<u>Product</u>	<u>Thousand Metric Tons</u>	
	<u>1949</u>	<u>1950</u>
Coke	100	200
Benzol, Refined	0.815	1.63
Toluol	0.198	0.396
Xylene	0.071	0.142
Ammonium Sulfate	1.315	2.63
Coal Tar	4.3	8.6
Naphthalene	0.18	0.36
Phenol	0.038	0.076
Cresols	0.06	0.12
Xylenols	0.011	0.022
Anthracene	0.288	.575
Creosote Oil	1.14	2.28
Pitch	1.86	3.72
Solvent Naphtha	0.08	0.16

General Information.

As of 1943, a coke plant with two batteries of ovens and probably by-products plants were installed here. The planned output of this plant was 208,000 metric tons of coke per year.

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17. Ruchenkovo

Stalino Oblast
South Region

Number of Batteries: 4
Type of Batteries: Soviet Koppers
By-products Plants: Complete

Estimated Production
1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons						
	1932	1937	1940	1943	1947	1949	1950
Coke	500	1,300	1,400	0	500	780	1,050
Benzol, Refined	4.08	10.6	11.4	0	0	3.18	6.42
Toluol	0.99	2.57	2.77	0	0	0.77	1.56
Xylene	0.355	0.922	0.995	0	0	0.277	0.558
Ammonium Sulfate	6.58	17.1	18.4	0	0	5.13	10.37
Coal Tar	21.5	56.0	61.3	0	0	16.75	33.9
Naphthalene	0.9	2.34	2.52	0	0	0.7	1.42
Phenol	0.19	0.494	0.532	0	0	0.148	0.296
Cresols	0.3	0.78	0.84	0	0	0.234	0.472
Xylenols	0.055	0.143	0.154	0	0	0.043	0.086
Anthracene	1.42	3.74	4.0	0	0	1.11	2.25
Creosote Oil	5.7	14.8	16.0	0	0	4.45	9.0
Pitch	9.3	24.2	26.0	0	0	7.25	14.5
Solvent Naptha	0.41	1.06	1.14	0	0	0.32	0.645

General Information.

This plant began operations in 1931 after the installation of four batteries of Soviet Koppers ovens with complete by-products plants. Damolished in 1941, this plant did not resume operations until the restoration of two batteries was completed in 1946. Lacking definite information, it is assumed that by 1949 all of the plants had been sufficiently restored to allow by-products recovery equivalent to 50 percent of the maximum yield from the coal processed. In 1950 the production of coke-chemicals was probably equivalent to 75 percent of the maximum practical yield from the coal processed.

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18. Sergo (Kadiivka)
Voroshilovgrad Oblast
South Region

Number of Batteries: 4
Type of Batteries: Unknown
By-products Plants: Complete

Estimated Production
1928, 1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons							
	1928	1932	1937	1940	1943	1947	1949	1950
Coke	400	500	1,200	1,200	0	500	780	1,050
Benzol, Refined	3.26	4.08	9.78	9.78	0	0	3.18	6.42
Toluol	0.792	0.99	2.38	2.38	0	0	0.77	1.56
Tylene	0.284	0.355	0.852	0.852	0	0	0.277	0.558
Ammonium Sulfate	5.26	6.58	15.78	15.78	0	0	5.13	10.37
Coal Tar	17.2	21.5	51.5	51.5	0	0	16.75	33.9
Naphthalene	0.72	0.9	2.16	2.16	0	0	0.7	1.42
Phenol	0.152	0.19	0.456	0.456	0	0	0.148	0.296
Cresols	0.24	0.3	0.72	0.72	0	0	0.234	0.472
Xylenols	0.044	0.056	0.132	0.132	0	0	0.045	0.086
Anthracene	1.14	1.42	3.42	3.42	0	0	1.11	2.25
Cresote Oil	4.56	5.7	13.7	13.7	0	0	4.45	9.0
Pitch	7.45	9.3	22.3	22.3	0	0	7.25	14.5
Solvent Naphtha	0.33	0.41	0.98	0.98	0	0	0.32	0.645

General Information.

Four batteries of coke ovens were installed here in 1928. The type of batteries is not known. Complete by-products plants also were built, but nitrogen fixation was not included. This plant was demolished in 1941 and remained inactive until 1946, when the reconstruction of two batteries was completed. Full prewar production of coke and by-products at this plant probably will not be reached until about 1952. It is believed that the 1949 and 1950 output of coke-chemicals at this plant were equivalent to approximately 50 percent and 75 percent, respectively, of the maximum practical yields from the coal processed.

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19. Stalino
Stalino Oblast
South Region

Number of Batteries: 4
Type of Batteries: Soviet Koppers
By-products Plants: Complete

Estimated Production
1932, 1937, 1940, 1943, 1947, 1949-50

Products	Thousand Metric Tons						
	1932	1937	1940	1943	1947	1949	1950
Coke	600	1,300	1,500	0	500	780	1,050
Benzol, Refined	4.89	10.6	12.2	0	0	3.18	6.42
Toluol	1.19	2.57	2.97	0	0	0.77	1.56
Xylene	0.427	0.922	1.06	0	0	0.277	0.558
Ammonium Sulfate	7.89	17.1	19.7	0	0	5.13	10.37
Coal Tar	25.8	56.0	64.5	0	0	16.75	33.9
Naphthalene	1.08	2.34	2.7	0	0	0.7	1.42
Phenol	0.228	0.494	0.57	0	0	0.148	0.296
Cresols	0.38	0.78	0.9	0	0	0.234	0.472
Xylenols	0.066	0.143	0.165	0	0	0.043	0.086
Anthracene	1.71	3.71	4.27	0	0	1.11	2.25
Creosote Oil	6.84	14.8	17.1	0	0	4.45	9.0
Pitch	11.15	24.2	28.0	0	0	7.25	14.5
Solvent Naphtha	0.49	1.06	1.22	0	0	0.32	0.645

General Information.

The installation of four Soviet Koppers coke batteries (16 tons per oven) was completed here in 1932. In addition, complete by-products recovery plants and a small nitrogen fixation plant were installed. The plants were demolished in 1941 and remained inactive until 1946, when two batteries were restored without by-products recovery. It is believed that by 1949 the coke-chemical plants were sufficiently restored to allow the production of coke-chemicals equivalent to 50 percent of the maximum yield from the coal processed.

The third coke battery was reported to be back in operation in 1948. This plant reached its peak production in 1940 and will probably attain it again by 1952 or 1953. It has been assumed that the 1950 output of coke-chemicals was equivalent to approximately 75 percent of the maximum yield from the coal processed.

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20. Stalinsk (Kuznetsk)
Kemerovo Oblast
West Siberia

Number of Batteries: 5
Type of Batteries: Unknown
By-products Plants: Complete

Estimated Production
1932, 1937, 1940, 1943, 1947, 1949-50

Product	1932	1937	1940	1943	Thousand Metric Tons		
					1947	1949	1950
Coke	350	1,650	1,650	2,400	2,600	2,600	2,600
Benzol, Refined	2.85	13.45	13.45	19.66	21.2	21.2	21.2
Toluol	0.693	3.26	3.26	4.76	5.14	5.14	5.14
Xylene	0.248	1.17	1.17	1.7	1.85	1.85	1.85
Ammonium Sulfate	4.6	21.7	21.7	31.56	34.2	34.2	34.2
Coal Tar	15.1	71.0	71.0	120.0	112.0	112.0	112.0
Naphthalene	0.63	2.97	2.97	6.52	4.68	4.68	4.68
Phenol	0.133	0.627	0.627	0.912	0.988	0.988	0.988
Cresols	0.21	1.0	1.0	1.44	1.56	1.56	1.56
Xylenols	0.039	0.181	0.181	0.264	0.286	0.286	0.286
Anthracene	1.0	4.7	4.7	1.38	7.43	7.43	7.43
Cresote Oil	3.99	18.9	18.9	27.4	29.7	29.7	29.7
Pitch	6.5	30.7	30.7	44.6	48.3	48.3	48.3
Solvent Naphtha	0.29	1.35	1.35	1.96	2.12	2.12	2.12

General Information.

One source reports that four batteries of coke ovens were built here in the early 1930's, that two more were added during World War II, and that complete by-products plants had been installed along with the ovens. The same source reports that a nitrogen fixation plant was planned for installation here but was never built.

Another source reports that prior to 1937 four batteries of 55 ovens each, with an annual capacity of 450,000 metric tons of coke per battery, were installed here and that the fifth battery was completed in 1942. This source reports that coke capacity of this plant was 1,650,000 metric tons in 1937, in 1940, and in 1942, respectively; 2,150,000 tons in 1943; and 2,410,000 tons in 1944.

21. Tagil
Sverdlovsk Oblast
Urals

Number of Batteries: 4 or 8
Type of Batteries: Soviet Koppers
By-products Plants: Complete

Estimated Production
1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons				
	1940	1943	1947	1949	1950
Coke	500	1,900	2,000	2,000	2,000
Benzol, Refined	4.08	15.49	16.3	16.3	16.3
Toluol	0.99	3.76	3.96	3.96	3.96
Xylene	0.355	1.35	1.42	1.42	1.42
Ammonium Sulfate	6.58	25.0	26.3	26.3	26.3
Coal Tar	21.5	81.5	86.0	86.0	86.0
Naphthalene	0.9	3.43	3.6	3.6	3.6
Phenol	0.19	0.722	0.76	0.76	0.76
Cresols	0.3	1.14	1.2	1.2	1.2
Xylenols	0.055	0.209	0.22	0.22	0.22
Anthracene	1.42	5.4	5.7	5.7	5.7
Creosote Oil	5.7	21.7	22.8	22.8	22.8
Pitch	9.3	35.3	37.1	37.1	37.1
Solvent Naphtha	0.41	1.55	1.63	1.63	1.63

General Information.

One source states that eight batteries of Soviet Koppers coke ovens with complete by-products plants were installed here during the late 1930's. This same source states that a nitrogen fixation plant was put into operation about 1940. Another source states that in June 1942 four batteries of 69 ovens each, with a total capacity of 1,900,000 tons, were installed here. The 1941 production was reported to be 1,410,000 tons. In November 1946 this plant was reported to be experiencing a shortage of coal, and the coal basins were stated to be behind schedule in their shipments.

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22. Voroshilovsk (Alchayak)
Voroshilovgrad Oblast
South Region

Number of Batteries: 4
Type of Batteries: German Otto
By-products Plants: Complete

Estimated Production
1928, 1932, 1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons							
	1928	1932	1937	1940	1943	1947	1949	1950
Coke	500	500	1,200	1,500	0	400	780	1,05
Benzol, Refined	4.08	4.08	9.78	12.2	0	0	3.18	6.42
Toluol	0.99	0.99	2.38	2.97	0	0	0.77	1.56
Xylene	0.355	0.355	0.855	1.06	0	0	0.275	0.588
Ammonium Sulfate	6.58	6.58	15.78	19.7	0	0	5.12	10.37
Coal Tar	21.5	21.5	51.5	64.5	0	0	16.75	33.9
Naphthalene	0.9	0.9	2.15	2.7	0	0	0.7	1.42
Phenol	0.19	0.19	0.456	0.57	0	0	0.148	0.296
Cresols	0.3	0.3	0.72	0.9	0	0	0.234	0.472
Xylenols	0.055	0.055	0.132	0.165	0	0	0.043	0.086
Anthracene	1.42	1.42	3.42	4.28	0	0	1.11	2.25
Cresote Oil	5.7	5.7	13.7	17.1	0	0	4.45	9.0
Pitch	9.3	9.3	22.3	28.0	0	0	7.25	14.5
Solvent Naphtha	0.41	0.41	0.98	1.22	0	0	0.32	0.645

General Information.

This plant began operations in 1928, following the installation of four German imported Otto batteries with by-products plants. Along with the other plants in the Donbas region, it was destroyed in 1941. The following extract reveals conditions at this plant after the war:

"After the war the one battery there was started with the old brick that had been there before, with much of the brick that needed replacing being taken from the more or less old brickwork of the other three batteries. The other three batteries needed entire reconstruction, from the foundations up. One such battery was practically finished in January-February 1947, but it could not be put into operation because the reconstruction of the coal-washing plant had not kept pace so that if the battery had been put into operation, it could not have been sufficiently supplied with washed coal. It was finished and held back until the reconstruction of the coal-

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washing plant could reach the capacity necessary to supply the two batteries. It was delayed some months. I believe it might have been put into operation in May or June 1947. The entire reconstruction work on the third battery had not begun. In fact, the old bricks still had to be removed from the foundation. This would require some 2 or 3 months and then the rebuilding would require another 4 to 6 months and putting the ironwork on, etc., another few months, so I imagine in 1948-1949, the third battery or 75 percent, could have been put into operation. [Other information states that the third battery was restored in February 1947.] The fourth battery could go into operation in 1950. By the time that went into operation the first battery would have to be demolished entirely, so I would say 100 percent would not be reached before 1951-52."

The 1940 production of coke-chemicals at this plant probably will not be reached until about 1952-53.

As was assumed for the other Donbas plants, coke-chemicals production for 1949 and 1950 was calculated on the basis of 50 percent and 75 percent, respectively, of the maximum practical yields from the coal processed.

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23. Yenakievo (Ordzhonikidze)

Stalino Oblast
South Region

Number of Batteries: 4 (in 1940)
Type of Batteries: Soviet Koppers
By-products Plants: Probably Complete

Estimated Production
1949-50

Product	Thousand Metric Tons	
	1949	1950
Coke	500.0	600.0
Benzol, Refined	2.04	3.67
Toluol	0.49	0.893
Xylene	0.177	0.32
Ammonium Sulfate	3.29	5.91
Coal Tar	11.75	19.35
Naphthalene	0.45	0.81
Phenol	0.095	0.171
Cresols	0.15	0.27
Xylenols	0.028	0.0495
Anthracene	0.712	1.28
Creosote Oil	2.85	5.14
Pitch	4.65	8.36
Solvent Naphtha	0.2	0.368

General Information.

As of 1940, four batteries of 180 ovens were installed here. It is believed that by-products were not recovered. This plant was demolished during the war and remained inactive until the start of production on 23 April 1947. Production as of March 1948 was reported to be 1,400 to 1,800 tons per day. Although definite information is lacking, it is believed that this plant was reconstructed with Soviet Koppers ovens and by-products plants. It is probable that by 1949 the by-products plants were recovering a quantity of chemicals equivalent to 50 percent of the maximum yield from the coal processed, and in 1950 chemicals production probably will be equivalent to 75 percent of the maximum practical yield from the coal processed.

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24. Zaporozhye
Zaporozhye Oblast
South Region

Number of Batteries: 4
Type of Batteries: Soviet Koppers (14½ Tons per Oven)
By-products Plants: Complete

Estimated Production
1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons					
	1937	1940	1943	1947	1949	1950
Coke	800	1,200	0	0	500	780
Benzol, Refined	6.52	9.78	0	0	0	1.59
Toluol	1.58	2.30	0	0	0	0.39
Xylene	0.567	0.85	0	0	0	0.139
Ammonium Sulfate	10.52	15.78	0	0	0	2.56
Coal Tar	34.4	51.5	0	0	0	8.37
Naphthalene	1.44	2.15	0	0	0	0.35
Phenol	0.304	0.456	0	0	0	0.074
Cresols	0.48	0.72	0	0	0	0.117
Xylenols	0.088	0.132	0	0	0	0.021
Anthracene	2.28	3.42	0	0	0	0.56
Creosote Oil	9.1	13.7	0	0	0	2.23
Pitch	14.9	22.3	0	0	0	3.62
Solvent Naphtha	0.65	0.98	0	0	0	0.16

General Information.

Four batteries of Soviet Koppers coke ovens (14½ tons per oven) were installed here in 1932 with complete by-products plants and a nitrogen fixation plant using coke-oven gas from Zaporozhye and Kamenskoe. All were demolished in 1941, and all were still inoperative in 1947. Two batteries of coke ovens were reported as restored in August 1948. This plant is located in the Dnieper region, and reconstruction lagged because of the necessity of first restoring the "Dnieprstroil" power plant. It is believed that the by-products plants were not in operation in 1949, but it is thought that by 1950 they were sufficiently restored to recover a quantity of coke-chemicals equivalent to about 25 percent of the maximum yield from the coal processed.

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25. Zhdanov (Mariupol)
Stalino Oblast
South Region

Number of Batteries: 4
Type of Batteries: Soviet Koppers
By-products Plants: Complete

Estimated Production
1937, 1940, 1943, 1947, 1949-50

Product	Thousand Metric Tons					
	1937	1940	1943	1947	1949	1950
Coke	500	1,200	0	400	780	1,050
Benzol, Refined	4.08	9.78	0	0	3.18	6.42
Toluol	0.99	2.38	0	0	0.77	1.56
Xylene	0.355	0.85	0	0	0.278	0.588
Ammonium Sulfate	6.58	15.78	0	0	5.13	10.37
Coal Tar	21.5	51.5	0	0	16.75	33.9
Naphthalene	0.9	2.15	0	0	0.7	1.42
Phenol	0.19	0.456	0	0	0.148	0.296
Cresols	0.3	0.72	0	0	0.234	0.472
Xylenols	0.055	0.132	0	0	0.043	0.086
Anthracene	1.42	3.42	0	0	1.11	2.25
Creosote Oil	7.05	16.92	0	0	5.5	9.0
Pitch	9.3	22.3	0	0	7.25	14.5
Solvent Naphtha	0.41	0.98	0	0	0.32	0.645

General Information.

Four batteries of Soviet Koppers ovens were installed here with complete by-products plants in 1933. The plant was not destroyed by the retreating Russians in 1941 but was demolished by the Germans before they were driven from the Ukraine in 1943. Operations were not resumed until 1946, when the restoration of two batteries was completed.

The plant, as well as the other coke-chemical plants in the Donbas region, probably will not reach peak production until 1952-53. It has been assumed that by 1949 restoration of the coke-chemical plants had progressed sufficiently to allow by-products recovery equivalent to 50 percent of the maximum yield from the coal processed. The 1950 yield of coke-chemicals from this and other Donbas plants probably approached 75 percent of the maximum normally possible from the coal processed.

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26. Possible Plants.

In addition to the operating coke-chemical plants previously listed, the following plants are believed to be under construction:

- a. Komsomolsk
Khabarovsk Krai
Soviet Far East

It was reported that two batteries of Soviet Koppers coke ovens with by-products plants were installed here in the late 1930's and that two more batteries were added in about 1946. Other information states that, according to plan, this plant is to have a coke battery by 1950, but construction is lagging. This plant is not expected to produce any coke-chemicals in 1950.

- b. Fergana
Tashkent Oblast
Uzbek SSR
Kazakhstan and Central Asia

It was reported that construction was begun on this plant in the middle 1940's. Another source reported that this plant was still under construction in May 1949 and will have two batteries of ovens. This plant is not expected to produce any coke-chemicals in 1950.

- c. Tkvarcheli
Georgian SSR
Transcaucasus

One source reports that two batteries under construction should have been in operation early in 1949 and that a by-products plant had been projected and construction begun. Another source reports that as of 1947 two batteries of 61 ovens each with a total capacity of 640,000 metric tons per year were planned. This plant was reported as still being under construction in 1949 and was not expected to produce any coke-chemicals in 1950.

- d. Cherepovets
Vologda Oblast
Northwest Region

A large steel mill, including a coke plant, is alleged to be under construction here and will use Pechora coal.

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27. Other Plants.

In addition to the coke-chemical plants previously listed as producing and as being under construction, the following prerevolutionary plants produced coke without by-products recovery: Almaznaya, two batteries; Kadievka, four batteries; Mushketovo, six batteries; Nikitovka, two batteries; Old Gorlovka, two batteries; Ollkhovka (Artemovsk), two batteries; and Smolyanka, four batteries. All of these plants were located in the Donbas region, and it is estimated that the production of coke from them in 1950 amounted to a total of about 450,000 metric tons.

An unconfirmed report locates a coal coking plant adjacent to a coal mine situated $1\frac{1}{4}$ miles east of the Cherepankhovo railroad station in Irkutsk Oblast in East Siberia. Coke batteries also have been reported at Dudinka, about 200 miles north of Igarka in the Norilsk coal field. It is not known whether this plant has by-product recovery facilities. Dudinka is in Krasnoyarsk Krai in East Siberia.

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